

# Volcanoes may be active on Mars

SPINA  
Feb 11  
11-16  
20/11/04

Photographs taken by a spacecraft orbiting Mars indicate that active volcanoes may still exist on the planet, a finding that further erodes its image as a dead world and offers prime sites to prospect for signs of Martian life.

The pictures, from Mars Express, an orbiter of the European Space Agency, indicate geologically recent volcanic activity in the summit craters of five volcanoes. Some areas show activity as recently as four million years ago. Since that is within the most recent 1 percent of Martian history, the suggestion that the planet retains a capacity for volcanic activity is strong.

"I suspect that as we get more spacecraft in orbit that it will increase the chances of seeing some kind of active eruption," said Dr James W Head III, a professor of geological sciences.

Dr Head is one of more than 40 scientists who contributed to an analysis of the images, which is to be published in this week's issue of the British journal *Nature*.

In the last few years, researchers have found abundant evidence of ice at the Martian surface and signs that water flowed there in the past. The latest work suggests that water could still bubble up in hydrothermal springs that might be found on some volcanic peaks.

"This is of great interest to biologists," said Dr Michael Carr, a planetary scientist at the US Geological Survey's office in California.

Researchers have discovered in the re-

cent past that hydrothermal environments on Earth are remarkably rich in life. Hydrothermal vents on the ocean floor and hot springs on land provide the nutrients and the energy to sustain rich ecosystems. Some biologists even argue that life began in such places.

Martian hydrothermal systems would probably look much like the steaming pools and spouting geysers of Yellowstone, Dr Carr said. If such environments do ex-



ist on Mars, they would be a critical place for future missions to investigate.

The Mars Express orbiter has been taking three-dimensional images of the Martian surface since January. The European Space Agency expects that by the end of the craft's mission late next year, it will have photographed the entire planet to a resolution of 33 feet. AP

Science  
1-3  
2/11

# Cellphone radiation harms DNA: Study

**Munich/Amsterdam, Dec. 21** (Reuters): Radio waves from cellphones harm body cells and damage DNA in laboratory conditions, according to a new study majority-funded by the EU, researchers said yesterday.

The so-called Reflex study, conducted by 12 research groups in seven European countries, did not prove that cellphones are a risk to health but concluded that more research is needed to see if effects can also be found outside a lab.

The \$100 billion a year cellphone industry asserts that there is no conclusive evidence of harmful effects as a result of electromagnetic radiation.

About 650 million cellphones are expected to be sold to consumers this year, and over 1.5 billion people around the world use one.

The research project, which took four years and which was coordinated by the German research group Verum, studied the effect of radiation on human and animal cells in a laboratory.

After being exposed to electromagnetic fields that are typical for cellphones, the cells showed a significant increase in single and double-strand DNA breaks. The damage could not always be repaired by the cell. DNA carries the genetic material of an organism and its different cells.

"There was remaining

damage for future generation of cells," said project leader Franz Adlkofer.

This means the change had procreated. Mutated cells are seen as a possible cause of cancer. The radiation used in the study was at levels between a Specific Absorption Rate (SAR) of between 0.3 and 2 watts per kg.

Most phones emit radio signals at SAR levels of between 0.5 and 1 W/kg.

SAR is a measure of the rate of radio energy absorption in body tissue, and the SAR limit recommended by the International Commission of Non-Ionising Radiation Protection is 2 W/kg.

The study also measured other harmful effects on cells.

Because of the lab set-up, the researchers said the study did not prove any health risks. But they added that "the genotoxic and phenotypic effects clearly require further studies ... on animals and human volunteers."

Adlkofer advised against the use of a cellphone when an alternative fixed line phone

was available, and recommended the use of a headset connected to a cellphone whenever possible.

"We don't want to create a panic, but it is good to take precautions," he said.

# Blow to US efforts on cloning ban

PRESS TRUST OF INDIA

UN HQ, Nov. 20. — In a blow to US efforts to get the United Nations ban all types of cloning of human embryos, the legal committee of the UN General Assembly has decided to shelve two opposing resolutions and instead try to find a consensus for a non-binding political declaration on the issue.

The import of the decision is that the 191-member UN General Assembly now would not have to vote on the two competing resolutions, one by Costa Rica and the other by Belgium.

The resolutions simply called for starting work of drafting a treaty on human cloning but differences arose over whether all types of cloning should be prohibited or whether therapeutic research should be permitted.

been considering the issue since 2001, had before it two drafts.

The one from Costa Rica, backed by the United States, called for banning all types of cloning; and the other by Belgium left the question of therapeutic cloning to be decided by the members states themselves.

The Italian proposal offered face-saving options to both and they decided to go along.

A working group would start efforts in February to find a consensus for a political statement, but diplomats say that there is no certainty that it would succeed.

Both sides agree cloning and research for producing babies should be banned but they differ on stem cell research which scientists say has the potential of finding cure to currently incurable diseases like diabetes,

cancer, Alzheimer and spinal cord injury among others.

While one side sees the potential of saving millions of lives by stem cell research, the other side considers it as destruction of human life and raises the fear that it could lead to women in poor countries being exploited to get pregnant and then abort, so that scientists could procure stem cells for research.

Those who favour stem cell research saw in the committee's decision opposition by a majority of 191 members of the United Nations to the American position. But Ambassador of Costa Rica Mr Bruno Stagno Ugarte said that his proposal could have got a majority but Belgium and its supporters could have tied it in procedural wrangle.



**Dolly ~ the first clone**

After the committee agreed to Italy's face-saving proposal without vote, both sides claimed victory with those opposed to all types of cloning, led by the United States, saying they had stopped the UN from approving therapeutic cloning and the other side claiming that the world body has not banned stem cell research or therapeutic cloning.

The committee, which has

# Europe's first Moon mission

Associated Press

BERLIN, Nov. 16. —A small spacecraft has made it into lunar orbit, signalling Europe's first successful mission to the moon and paving the way for the craft to be used to study the lunar surface, a European Space Agency spokesman said today.

The SMART-1 probe made it to within 5,000 km from the moon yesterday morning, and will now begin spinning its way closer to the surface as it orbits, said ESA spokesman Mr Franco Bonacina from the space agency's headquarters in Paris.

By mid-January the dishwasher-sized spacecraft will be in an elliptical orbit that will take it within 300 km of the moon's south pole and 3,000 km from the north pole, Mr Bonacina said.

"Today we have celebrated the successful technology mission, and now we start with science — we want to do imaging of the surface and study the chemistry of the moon," Mr Bonacina said.

Over the last 13 months, the

# Europe's first Moon mission a success

367-kg probe has been pattering towards the moon in a mission controlled from the ESA's operations centre in Darmstadt in southern Germany. It measures 3.3 feet on each side, and solar panels spread over 46 feet.

To reach the lunar orbit, it used only 59 kg of the 82 kg of xenon fuel it had aboard — less than expected, and a feat that has raised hopes the technology can be used to send other craft longer distances.

"It works out to something like 2 million km per litre (quarter gal-

lon), which is quite an achievement," Mr Bonacina said.

For this mission, the surprising fuel efficiency of the spacecraft means that the agency might be able to extend its six-month scientific mission by up to a year, if it can find the additional funding, Mr Bonacina said.

When the mission is eventually complete, the probe will be left to crash onto the moon's surface.

The mission marks the second time that ion propulsion has been used as a primary propulsion system.

The first was the Deep Space 1 probe launched by NASA in October 1998.

SMART-1, short for "Small Missions for Advanced Research and Technology," was developed for ESA by the Swedish Space Corporation with contributions from some 30 contractors in Europe and the USA. It took off aboard an Ariane-5 rocket in September 2003.

The total cost for the mission is euro 110 million (\$142.3 million), about a fifth of that required for a typical major space mission.



This artist's impression image given by the European Space Agency shows SMART-1 travelling to the Moon using a new solar-electric propulsion system. — AFP

# Alzheimer's steals more than memory

By Denise Grady

It happened without warning, early one day last summer as they prepared to go out. Gloria Rapport's husband raised his arm to her, fist poised. "He was very close to striking me," she said. What had provoked him? "Nothing," she said. "I asked him to get into the car."

Rapport's husband, Richard, 71, has Alzheimer's disease. His forgetfulness and confusion began about nine years ago, not long after they married. But emotional troubles have begun of late. Anxiety came first: he suddenly feared being left alone in the house. Outbursts of anger followed. The man she had always known to be kind and gentle could in an instant turn "cunning, nasty, aggressive, menacing". "The behavioural changes I've seen are absolutely frightening," she said.

Although memory loss is the best-known Alzheimer's symptom, the disease can also cause psychiatric problems that lead to profound changes in personality, mood and behaviour. People who were happy and good-natured for most of their lives suddenly become fearful, depressed, deluded or angry, sometimes even violent. Many families hide such symptoms, and perhaps as a result, psychiatric problems were long thought to affect only a minority of people with Alzheimer's disease or other types of dementia.

Only recently has it become clear that emotional and behavioural troubles are nearly universal among people with Alzheimer's disease and the problems are frequently intractable and



Gloria and Richard

more upsetting to families than the mental slowing. Depression and apathy are the most common psychiatric symptoms. But agitation, aggression and psychotic behaviours are the leading reasons Alzheimer's patients are put into nursing homes.

"They are extraordinarily distressing and wearing on care givers," said Constantine Lyketsos, a psychiatrist and Alzheimer's expert at Johns Hopkins. More than four million Americans have Alzheimer's disease, and the number is expected to increase as the population ages. Dr Lyketsos said doctors had become increasingly aware that elderly people who suddenly showed signs of mental illness might actually have Alzheimer's disease, though in the past they might have been given diagnosis like "late-life psychosis", depression or nervous breakdown.

Rapport said, "Most families won't talk about it. I equate this disease to how leprosy used to be. We've lost good friends, and we have family members who won't have anything to do with us. I think they're afraid of it, and there's a real stigma that the person is crazy. I think it's why a lot of families hide people away who have it."

The symptoms distress not just families, but the patients too. "If your moods are labile or you get anxious and scared, there's a fair bit of suffering that goes with that," Dr Lyketsos said. "If you have visions, or develop ideas that people are trying to steal from you or hurt you, there's a fair bit of suffering." NYT News Service

# India gets its first rabies vaccine

Statesman News Service

BANGALORE, Nov. 2. — The Pune based Serum Institute of India limited, today launched the first indigenously developed rabies vaccine, Rabivax.

According to Dr Cyrus Poonawala, chairman, SII, Rabivax is the first indigenously developed Human Diploid Cell rabies vaccine in the country. Priced at Rs 293 per unit, it will come as a boon to affected patients as the imported varieties cost over Rs 1200 each.

The SII is said to be a leader in vaccine technology and the largest manufacturer in India. The Rs 500 crore company supplies vaccines to more than 130 countries. Its products include anti snake venom, measles vaccine, mumps, Rubella virus vaccine and recombinant Hepatitis B vaccine.

He told newsmen here today that in comparison to other tissue culture vaccines, HDC products were considered better for the high standard of protection that they offered. The



**Rabivax is the first indigenously developed Human Diploid Cell rabies vaccine in the country. Priced at Rs 293 per unit, it will come as a boon to affected patients as the imported varieties cost over Rs 1200 each**

World Health Organisation, he said, considered the HDC vaccine as a Gold Standard.

Dr Hitt Sharma, medi-

cal director, SII, on his part, said that on an average as many as 20,000 deaths were reported every year from rabies in the country. An estimated 17 million were bitten by animals annually, globally and faced danger of being exposed to rabies.

The dreaded virus infects domestic and wild animals. It is transmitted to humans through close contact with saliva from infected animals including bites, scratches, licks on broken skin and mucous membranes.

He said that another advantage of HDC related to the fact that even those allergic to vaccine components could take Rabivax to eliminate the risk factor. Clinical trials and studies, he added, had established this. Clinical trials for Rabivax involved around 200 patients and more than a 1000 doses of the vaccine.

Free of antibiotics like Neomycin, Streptomycin and Polymyxin-B, the HDC vaccine, he claimed, was a boon to people who were allergic to such compounds.

3 NOV 2004

THE STATESMAN

# A curry-leaf coup against diabetes

By Rashmee Z Ahmed/TNN

**London:** India's traditional diabetic remedy from its native curry-leaf tree really does work and could potentially lead to an alternative anti-diabetic drug and spawn a multi-billion-dollar industry, it was revealed at a landmark British pharmaceutical conference on Wednesday.

The claims for the curry-leaf tree (*Murraya koenigii*) are made on the basis of a research hailed by complementary medicine specialists as good and qualitative. The research, led by Professor Peter Houghton of King's College, London, is significantly supported by a grant from a leading US drug company, Merck Research Laboratories.

On Wednesday, Edzard Ernst, a British complementary medicine professor who has long argued for greater and closer links between Western researchers and Indian ayurvedic producers, told TOI that he was very encouraged by the curry-leaf tree research.

Houghton, who presented his findings to the British pharmaceutical industry's premier gathering, said extracts from the curry-leaf tree appeared to restrict the action of a digestive enzyme called pancreatic alpha-amylase. The enzyme is involved in the breakdown of dietary starch to glucose.

"A patient with diabetes does not produce enough insulin to cope with rapid rises in blood-glucose levels," Houghton explained. "That is why slowing the rate of starch breakdown, by blocking alpha-amylase, can lead to a more even trickle of glucose into the bloodstream from the intestine. This is what the curry-leaf tree appears to do." Using folksy analogy, Houghton said it was rather like restricting people coming out of a station gate in the rush hour so that they come out one at a time rather than seven at a time. Complementary medicine experts said the new research was one of the first serious, big business-supported initiatives to try and unlock the treasures of Indian and Chinese plants.



1 OCT 2004

# Boon for chemo patients

Science & Technology

## Miracle surgery fertilises Belgian woman

Agencies

Brussels, September 24

A CANCER patient made infertile by chemotherapy has, in a world first, given birth after revolutionary treatment, Belgian doctors say.

Ovarian tissue from the Belgian mother, 32, was removed and frozen seven years ago before chemotherapy, then re-implanted into her pelvis last year.

She conceived naturally and gave birth at Brussels' Cliniques Universitaires Saint-Luc this week, the *Lancet* reported.

Researchers said all young women with cancer should be offered the treatment. New mother Ouarda Tourirat, speaking at a press conference on Friday, said: "I'm very happy, it's what I've always wanted. It was a dream."

Baby Tamara, weighing 3.72kg was born on Thursday night.

A spokeswoman for the hospital said: "It is the first birth ever of its kind. The implications are that if it has worked once it can be proposed to other women in a similar situation — women who are suffering from certain kinds of cancer." "When they are cured this tissue can be re-implanted and hopefully pregnancy could ensue from that. Obviously the implications for the future are great."

Lifesaving cancer treatment as a child of young adult can cause many women to go through an early menopause and become infertile. Radiotherapy is thought to be harmful than chemotherapy.

Experts stress most



AP

**WONDER GIRL** Baby Tamara sleeps in the arms of her mother, Ouarda Tourirat, at a Brussels hospital on Friday.

women who undergo chemotherapy will not become infertile. However, the treatment may lead the length of time they are fertile being shortened.

Doctors across the world have been working to enable cancer patients to become pregnant for many years. The Belgian doctors say the fact that a successful birth has been achieved offers hope to thousands of infertile cancer patients.

The Cliniques Universitaires Saint-Luc says it has frozen ovarian tissue from 146 other cancer patients. So far, the tissue has been reimplanted in two.

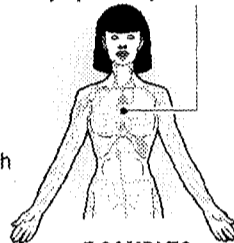
### OVARIAN TRANSPLANT

A Belgian woman has given birth to the world's first baby born after an ovarian tissue transplant

#### 1997: CANCER DIAGNOSED

► **CANCER**  
25-year-old woman has **stage IV Hodgkin's lymphoma**, a disease that spreads through the lymphatic system

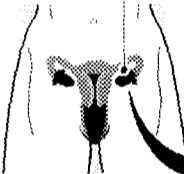
Lymphatic system



Ovary

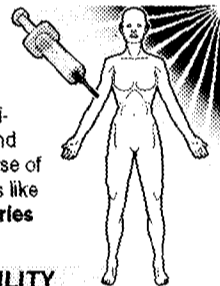
◀ **SAMPLES**

Using keyhole surgery, **five tiny samples** from her left ovary are removed and stored at **-196°C**



► **TREATMENT**

Patient receives six months of **chemotherapy** (intravenous anti-cancer drugs) and **radiotherapy** (use of high-energy rays like x-rays). Her **ovaries stop working**

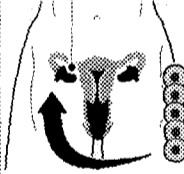


#### 2003: FERTILITY

Ovary

◀ **TRANSPLANT**

Declared **free of cancer**, surgeons transplant her ovarian samples into a pelvic space near her right ovary



► **FERTILITY**

Seven months later, tests show woman is producing hormones and has begun having **menstrual cycles**. Five months after that she falls **pregnant** and gives birth to baby girl in 2004

REUTERS



TUESDAY, SEPTEMBER 21, 2004

149-10  
2/19

## TEACHING FROM SPACE

Science & Tech

"INDIAN SCIENCE AND technology must make a greater difference to the lives of our people," said Prime Minister Manmohan Singh at the Shanti Swaroop Bhatnagar Awards ceremony recently. EDUSAT, which the Indian Space Research Organisation has successfully launched onboard its own Geosynchronous Satellite Launch Vehicle (GSLV), will strive to meet that objective. As its name suggests, this is a satellite devoted to education and training at all levels. Space technology is to be harnessed to solve a pressing problem: the lack of good teachers and teaching material. This is especially an issue for students in smaller towns and villages. Using satellite broadcasts, a single teacher can reach thousands of students across the country. Not only will the students be able to see and hear the teacher, they can also ask questions and seek clarifications. The great hope is that the reach and impact of this technology will provide the impetus for various educational authorities and bodies to identify their best teachers and attempt new teaching methods. In the semi-operational phase that is expected to last about two years, it is estimated that programmes from EDUSAT can reach 1,000 classrooms and 50,000 students. These numbers are likely to rise manifold as institutions gain familiarity and confidence, and the technology spreads and finds new users. EDUSAT will propel India into a leadership role in distance education over satellite, predicts the ISRO chairman, G. Madhavan Nair.

The successful launch of the GSLV from the Satish Dhawan Space Centre at Sriharikota also shows that ISRO has put behind it the grievous accident at a solid propellant facility that claimed several lives in February this year. ISRO now faces new endeavours and challenges. The Second Launch Pad, which has been executed

by industry on a turnkey basis, is getting ready and is likely to be commissioned soon. Launch vehicles will be integrated in a separated building, instead of right at the pad as at present, and then moved to the launch pad just before launch. With the launch pad occupied only for a short period of time, ISRO will be able to carry out more launches from Sriharikota. While the present GSLV flew with a Russian-made cryogenic engine and stage, the development of the indigenous equivalent is nearing completion. In addition, ISRO is developing the GSLV Mark-III, which will have one and a half times the payload capability of the present GSLV. For the Mark-III, ISRO will need to develop a giant solid propellant booster as well as a more powerful cryogenic engine. ISRO hopes to have the GSLV Mark-III ready before the end of this decade.

For all its capabilities, ISRO is yet to break into the world market for building satellites and for launch services. Cumbersome U.S. export control regulations, which treat satellites and satellite components as armaments, pose a major hurdle. ISRO has clearly been deprived of satellite launch contracts as a result of these regulations. One can only hope that the partnership Boeing and ISRO are trying to forge for building satellites — Boeing needed a licence from the U.S. Government just to talk to ISRO and exchange technical information — will come to fruition. The latest relaxation in U.S. export licensing policies that has been announced appears to remove only ISRO Headquarters from the U.S. Department of Commerce's Entity List; several ISRO units are still on the list. There is a presumption of denial of export licences for dual-use high technology items to organisations on the Entity List. Both countries must address these issues meaningfully.

THE HINDU

21 SEP 2004

Associated Press  
UTAH, Sept. 8. — The Genesis space capsule, which had orbited the sun for more than three years in an attempt to find clues to the origin of the solar system, crashed to Earth today after its parachute failed to deploy.

It wasn't immediately known whether cosmic samples it was carrying back as part of a six-year, \$260 million project had been destroyed. Nasa officials believed the fragile disks that held the atoms would shatter even if the capsule hit the ground with a parachute.

"There was a big pit in my stomach," said physicist Roger Wiens of Los Alamos National Laboratory, which designed the atom collector plates. "This wasn't supposed to happen. We're going to have a lot

## Genesis comes crashing

of work picking up the pieces. <sup>delivered</sup> <sup>fell heavily</sup> Hollywood stunt pilots had taken off in helicopters to hook the parachute, but the refrigerator-sized capsule — holding a set of fragile disks containing billions of atoms collected from solar wind — hit the desert floor without the parachute opening.

The impact drove the capsule halfway underground. Nasa engineers, fearing the explosive for the parachute might still be alive and ready to fire, kept helicopter crews at bay. "That presents a safety hazard to recovery crew," said Mr Chris Jones, solar system exploration director for Nasa's Jet Propulsion Laboratory.

The choppers were supposed to snatch the capsule's parachute with a hook as it floated down at more than 1.8 metres per second. But the capsule tumbled out of control.

Scientists hoped the capsule's charged atoms — a "billion billion" of them — would reveal clues about the origin and evolution of our solar system, said Mr Don Burnett, Genesis principal investigator and a nuclear geochemist at California Institute of Technology. "We have for years wanted to know the composition of the sun," Mr Burnett said before the crash. He said scientists had expected to analyse the material "one atom at a time."

Genesis had been moving in tandem with Earth outside its magnet-



The Genesis capsule on the ground in Utah on Wednesday. — AFP

ic shield on three orbits of the sun. Mr Cliff Fleming, the lead helicopter pilot, and backup pilot Mr Dan Rudert, had replicated the retrieval in dozens of practice runs.

# Cloning nod in Britain

*several*  
**London, Aug. 11 (Reuters):** British scientists today said they had received permission to clone human embryos for medical research, in what they believe to be the first such licence to be granted in Europe.

The decision is likely to reignite an ethical debate on human therapeutic cloning as opponents fear it could be used to clone babies, which is outlawed in Britain.

In a procedure based on the same technique that created Dolly, the first cloned sheep, the scientists will create embryos as a source of stem cells to help develop new treatments for diabetes and degenerative diseases such as Alzheimer's and Parkinson's.

They will duplicate early-stage embryos and extract stem cells from them. The embryos will be destroyed before they are 14 days old and will

never be allowed to develop beyond a cluster of cells the size of a pinhead.

"This research should give valuable insight into the development of many diseases and benefit millions of patients," Dr Miodrag Stojkovic, a member of the team at Newcastle University in northern England, said.

"It's not about cloning babies. To my knowledge this is the first time in Europe that such a licence has been granted," he added.

Earlier this year, scientists in South Korea announced that they had produced the first human cloned embryos.

Stojkovic said it would be at least five years before patients could receive stem cell treatment based on their work.

Stem cells are master cells of the body that can develop into other cell types.

Science & Technology

# Paan-Indian cure for blood cancer

G-1 8/17

**Kolkata:** A group of scientists in CSIR here have claimed to have made a major breakthrough in cancer studies when they struck upon a molecule in betel (paan) leaf that targets and kills leukemia cells and holds the promise of becoming the world's first herb-based, cheap therapeutic drug for blood cancer.

A multi-disciplinary team from CSIR's premier lab Indian Institute of Chemical Biology (IICB) here is ecstatic with the serendipitous find since there is just one exorbitant drug currently available across the world for the treatment of chronic myelogenous leukemia (CML), a severe type of blood cancer.

The molecule, identified as chlorogenic acid, code-named ICB-101 throughout the three-year hush-hush study, came as a chance discovery while the team was conducting immuno-modulatory studies on betel leaf and its effect on human cell lines.

"We found that chlorogenic acid induced programmed cell death in human cancer cells transplanted in experimental nude mice," immunologist and team leader Santu Bandyopadhyay said.

The 12-member team, comprising IICB director and cell biologist Prof Samir Bhattacharya, has applied for US and global patents for the molecule.

The pathbreaking work, to be published in the journal 'Blood' in October, has been given a verbal go-ahead for immediate multi-centric human trials in the country by director general of

Indian Council of Medical Research (ICMR) Dr N K Ganguly, the team disclosed.

The molecule, tested on human cancer cell lines obtained from America, Milan-based Istituto Nazionale Tumori and Meikai University School of Dentistry in Japan, showed no effect on the growth of non-cancerous cells. Agencies



# Space odyssey, private limited

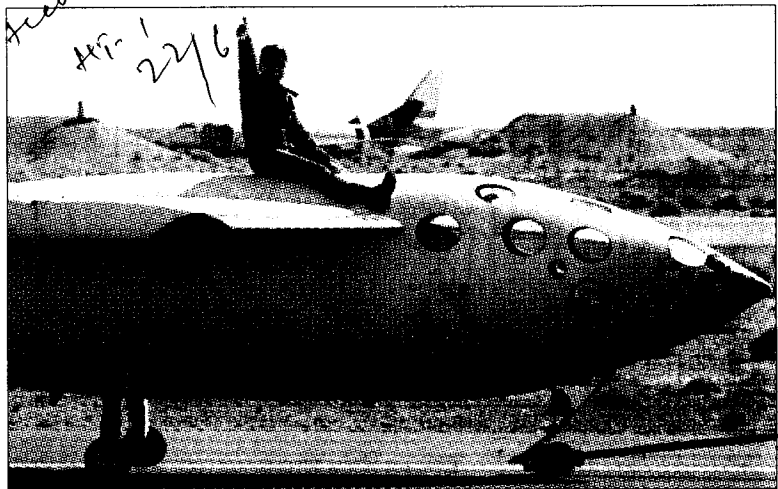
REUTERS

Agencies  
Mojave (California), June 21

A PRIVATE 'rocket plane' today successfully punched beyond the Earth's atmosphere in the world's first manned commercial space flight. The privately funded SpaceShipOne was released from a larger plane called the White Knight and ignited its rocket engine to enter space 100 km above Earth. It landed safely back on a runway in the Mojave Desert in California, about 160 km north of Los Angeles.

The unprecedented \$20 million project was intended to demonstrate the viability of commercial space flight and open the door for space tourism. The white rocket plane with its striking nose — a pointed cone covered with small portholes — was designed by legendary aerospace designer Burt Rutan and was funded by billionaire Paul Allen, who co-founded Microsoft Corp.

It was piloted by 62-year-old Michael Melvill, who after the successful flight, officially became an astronaut. "I'm flattered to have been chosen for this," said Melvill. "I'm hoping there will be a repeti-



Pilot Michael W. Melvill celebrates after landing SpaceShipOne.

tion, a little higher, a little faster."

After burning its rocket for 80 seconds, SpaceShipOne spent 3-1/2 minutes at its peak altitude, a short suborbital hop that made Melvill weightless and gave him a clear view of Earth's curvature and the black expanse of outer space. The flight marked the first time that a non-government spacecraft reached

the altitude considered to be the boundary between Earth's atmosphere and outer space. "The flight is a milestone that may lead to a new space age," Rutan said. "There is an enormous hunger to fly in space and not just to dream about it. We want our children to go to other planets."

See also SCI-TECH, Page 5

# Sars can spread through tears, say researchers

*Science  
technology*

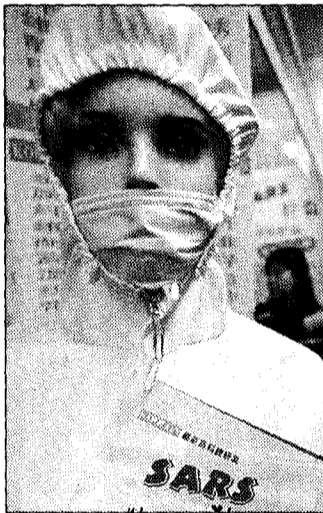
**London, June 20 (Reuters):** Tears could be a means of spreading Sars but analysing samples taken from tear ducts could also help with detecting the virus early, doctors in Singapore said.

Dr Seng Chee Loon of the National University Hospital in Singapore and his colleagues found the virus in samples taken from tear ducts they analysed from 36 patients suspected of being infected last year.

The highly infectious respiratory illness, Severe Acute Respiratory Syndrome (Sars), has infected more than 8,000 people in nearly 30 countries and killed nearly 800, according to the World Health Organisation.

The outbreak, which first emerged in southern China in 2002, was brought under control, but public health experts fear it could re-emerge.

In the Singapore study three of the eight patients who had probable Sars had the virus in their tears. All of them were newly infected. In one patient the virus was only found in the tears.



**A suit used for guarding against Sars displayed at a Beijing exhibition.**

"This is the first case series reported with the detection of the Sars coronavirus from tears and has important implications for the practice of ophthalmology and medicine," Loon said in a report in the *British Journal of Ophthalmology*.

The findings suggest that the virus can be detected and isolated in the early phase of infection and could be an important diagnostic tool because analysing tears is simple and easy.

But it also may mean that the virus could be spread through tears, in addition to droplets from coughs or sneezes, which could pose an additional health hazard for healthcare workers and the general public.

"Ophthalmic practices may need to change as more stringent barrier methods, appropriate quarantine, and isolation measures are vital when managing patients with Sars," Loon added.

Scientists identified its cause as a new virus from the family of coronaviruses that are responsible for the common cold and a range of animal illnesses.

Loon said he did not find the virus in the tears of other patients whose symptoms started earlier, which could mean sampling tear ducts may provide an early test for the illness.

"The study also suggests that Sars, like other viruses, can involve the eyes," he added.

# The World Watches Venus

**New Delhi/Kolkata:** Millions of citizens across the country saw the transit of Venus on Tuesday even though the weather played spoilsport for some. With the blazing sun for a backdrop and not a speck of cloud in the sky, the planet of love began its rare cosmic journey across the Sun enabling Kolkata's skygazers to witness the phenomenon in all its glory.

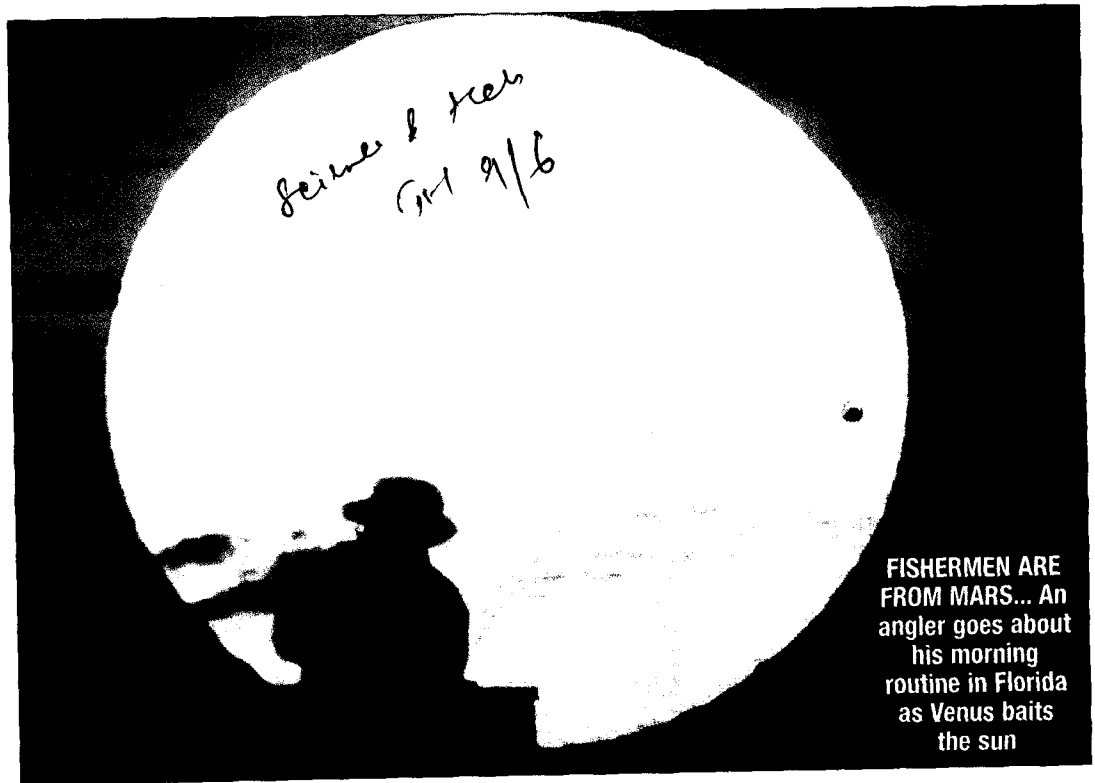
Children and astronomy buffs thronged to witness the phenomenon at various venues in Ahmedabad, Mumbai and Chennai as well.

But it was a dampener for Delhi-ites, including a team of US scientists gathered in the capital, as well as those living in nearby areas. Though the weatherman had predicted clear skies, a duststorm clouded the sun and Venus.

People gathered at Nehru Planetarium were disappointed at not being able to view the event, despite the elaborate arrangements to enable people to view the transit safely. US scientists get a taste of Indian weather, as the little makeshift tent erected at the sprawling US embassy lawn was blown by a strong wind. Scientists struggled hard to protect the \$20,000 equipment imported specially to record the event.

"It is bad. We have missed a part of the transit," said Timothy R Young from the University of North Dakota, who led a team of four astronomers. "However, we have been able to watch the first two hours of the transit, from the time when Venus entered the limb of the Sun."

As the monsoon played truant on the official date of its scheduled onset in Kolkata, amateur skygazers and astrophysicists were delighted to be able to view the celestial event. "Any other year, we would have cribbed about the monsoon not showing up. Not this time. The pictures of Venus' transit are spectacular," said Debi Prosad Duari, scientific director of M P Birla Planetarium. Agencies



## A tiny speck, but a big spectacle

**Greenwich:** The rare spectacle of tiny Venus passing across the face of the sun drew sky-gazers across a wide band from Australia to the edge of North America on Tuesday. In a park in Oslo, Norwegian astronomer Knut Joergen Roed Oedegaard proposed to his girlfriend Anne Mette Sannes on a stage in front of about 2,000 people gathered to watch the transit. She said yes to a thundering applause.

A blue sky over Sydney gave about 40 people looking through telescopes at the city's observatory a clear view. The sight had special significance for Australians—this country's east coast was "discov-

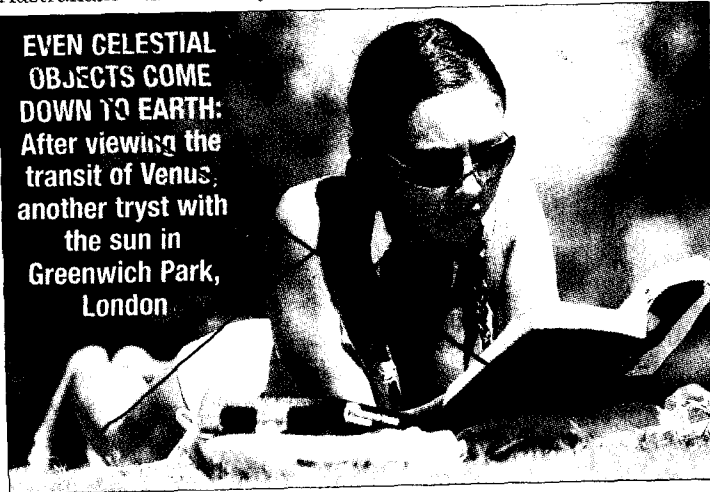
ered" by British explorer James Cook on his way home from viewing the 1769 transit in Tahiti. Rain and cloud obscured the show in Japan and Thailand. It also was cloudy in Hong Kong, but that didn't stop more than 100 people queuing up at the Hong Kong Space Museum, where several telescopes were waiting.

People in Africa, Europe and West Asia saw the entire transit, while northeast US and Canada saw only the tail end. "Spectacles such as this reinforce my belief that there is a creator, and we are just tiny specks within this universe," said Zulkarnain Hassan, 26, who caught a glimpse at the National Planetarium in Kuala Lumpur.

"The hook that got people was that there was no one in our lifetime who had ever seen it. My son Daniel got gripped by that," said Debbie Musselwhite, who came with 10-year-old son to join several hundred people at the Royal Observatory in Greenwich.

"It's a brilliant opportunity to know the mechanics of our solar system," said another visitor, Shereeza Feilden, 14. Some people were waiting in line at 6 am for a chance to use one of the filter-equipped telescopes provided by the observatory, said Emily Winterburn, curator of astronomy. Agencies

**EVEN CELESTIAL OBJECTS COME DOWN TO EARTH:** After viewing the transit of Venus, another tryst with the sun in Greenwich Park, London



# DREAM DATE WITH VENUS



Scientist Knud Jahnke points to Venus at the Einstein Tower at the Astrophysical Institute of Potsdam, Germany.

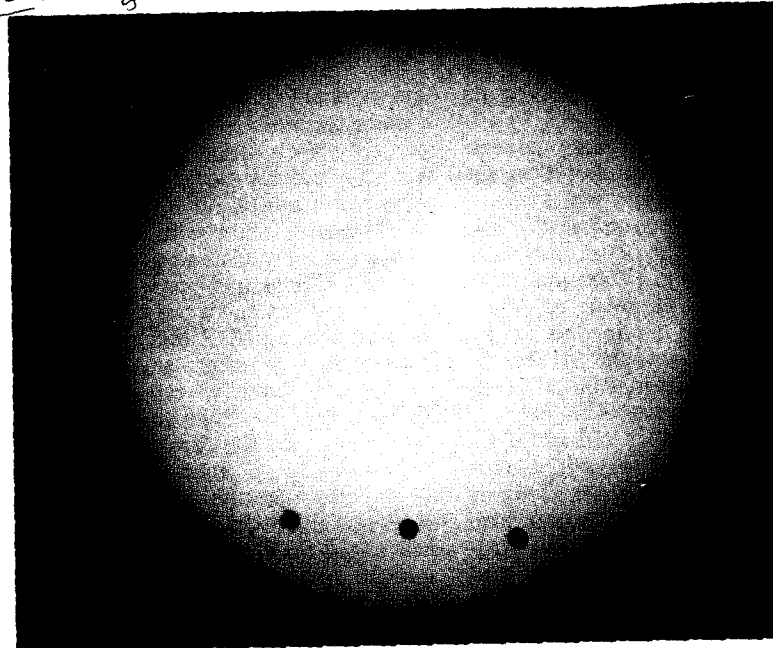
- 
**Heavenly sight** More than 2 lakh people watched Venus's transit across the surface of the Sun from the camps set up in the city. The crowd was the largest at the planetarium
- 
**Time for** The phenomenon lasted from 10.44 am to 4.50 pm. The 'black drop effect' was noticed around 11.03 am. The city had a good view of the internal ingress after that but the mid-transit view, around 1.47 pm, was obscured by clouds
- 
**Safety first** More than 2 lakh sun filters were sold in the state. Some who viewed the spectacle without the filters complained of eye problems
- 
**Global gaze** Africa, Europe and Asia saw the entire transit; the northeast corner of the US and Canada caught the tail end of the event  
**(See also Kolkata Live)**





# Earth hooked to Venus' stellar performance

ST-3 9/6 Science & Tech.



UP ABOVE THE WORLD SO HIGH: The sun rises through a bank of clouds over the East River of Manhattan as the planet Venus (dot on lower right of sun) crosses its face on Tuesday. (Centre) A picture taken by multiple exposure in Munich shows five different phases of Venus crawling across the sun during the planet's transit. (Right) A boy uses special glasses to see the phenomenon in Greenwich. — AFP

## Associated Press

GREENWICH, June 8. — The rare spectacle of tiny Venus passing across the face of the sun drew sky-gazers across a wide band from Australia to the edge of North America today.

Many came with a sense of cosmic wonder; some were only puzzled. "How come the sun had a black dot in it?" Dorcas Tam (7) asked in Hong Kong.

People in Africa, Europe and West Asia could see the entire transit, while the northeast corner of the USA and Canada saw only the tail end of the event.

"The hook that got people was that there was no one in our lifetime who had ever seen it," said Mrs Debbie Muschelwhite, who came with her 10-year-old son to join several hundred people at the Royal Observatory in Greenwich. Some people were waiting in

line at 6 a.m. for a chance to use one of the filter-equipped telescopes provided by the observatory, said Ms Emily Winterburn, curator of astronomy.

The Royal Observatory, beside the Thames in southeast London, has a historic connection to the transit, which occurs twice — eight years apart — about every century. In 1716, Edmond Halley of comet fame observed the transit at Greenwich to calculate the distance between the

Earth and the sun.

Planetariums the world over — from Bhubaneswar to Boston — set up telescopes with eye-protecting solar filters.

In Greece, two US experts stationed themselves at opposite ends of the country in hopes of unlocking the mystery behind the "black drop effect", which makes Venus appear teardrop shaped instead of a circle when it aligns with the edges of the sun.

"It's perfect," gushed Mr Jay

Pasachoff, an astronomer at Williams College in Massachusetts, as he watched the event from the Observatory of Thessaloniki. "It's not a media event like the Oscars, but it's like a fine French wine for the people who know about it and enjoy it."

In Rome, priests, tourists, garbage collectors and even policemen lined up to view the eclipse through a telescope set up near St. Peter's Square. In Boston, about 500 people were

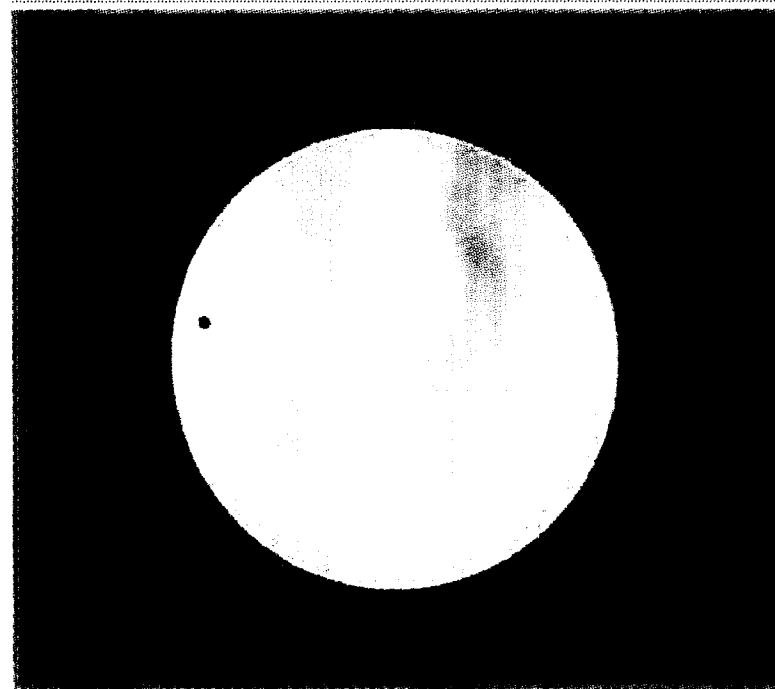
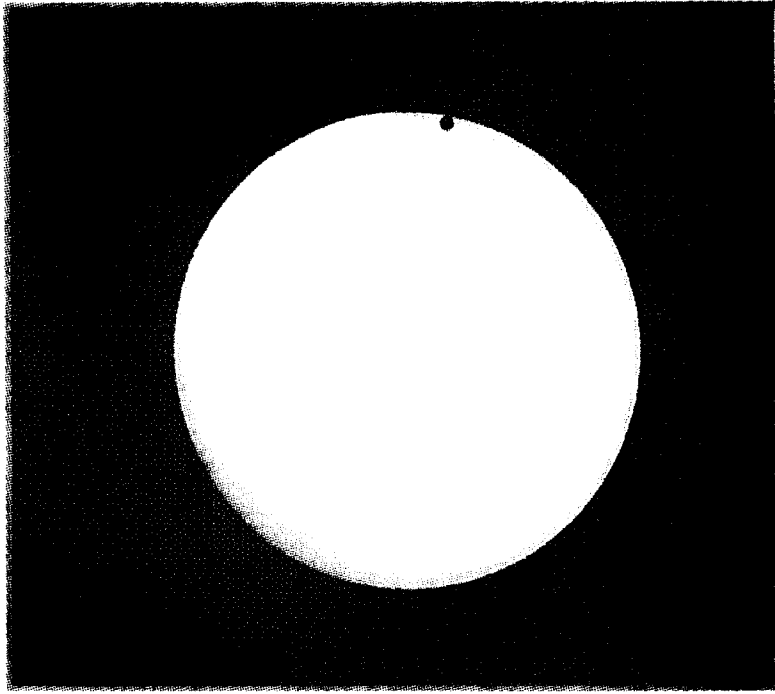
lined up at 5 a.m. to take a turn at a telescope atop the Harvard Smithsonian Center for Astrophysics.

A blue sky over Sydney gave about 40 people looking through telescopes at the city's observatory a clear view. The sight had special significance for Australians — the country's east coast was "discovered" by British explorer James Cook on his way home from viewing the 1769 transit in Tahiti.

Rain and cloud obscured the

show in Japan and Thailand. It also was cloudy in Hong Kong, but that didn't stop more than 100 people queuing up at the Hong Kong Space Museum, where several telescopes were waiting.

"Spectacles such this reinforce my belief that there is a Creator, and we are just tiny specks within this universe," said Mr Zulkarnain Hassan, who caught a glimpse at the National Planetarium in Kuala Lumpur, Malaysia.



9 JUN 2002

*The Economic Times*

# Venus transit: Why a cycle?

*Science & Technology Hi-5 8/6*

**O**N TUESDAY, the planet named after the Romans' Goddess of Love passes between the Earth and the Sun, a sight unseen by anyone alive today. The so-called Venus transit is, in fact, an eclipse, but unlike a solar eclipse, the Sun will be hardly dimmed. Instead, Venus will appear like a little black dot, eerily crawling across the face of our star for about six hours.

Venus transits recur like clockwork, though in an odd pattern.

Transits occur 8 years apart — in June or December. A pair of December transits follows a June pair after 105 and a half years, while a June pair comes 121 and a half years after a December pair.

That means the last transit was on December 6, 1882, and the next will be

on June 5-6, 2012, and the one after that will be 105 years down the track.

## Why this interval?

The orbital plane of Venus is inclined at an angle of 3.4 degree with Earth's orbital plane. So, physically, these planes cut at two points called nodes. Only when Sun, Venus and Earth are at this point does the transit occur. Earth has a revolution period of about 365.0256 days, while Venus has 224.701 days.

The Lowest Common Multiple is 8 years. If you do further calculations, the other two solutions are 121 and half and 105 and half.

The Venus transit was first predicted by the 17th Century mathematician Johannes Kepler. Since then, only six have been recorded: in 1631, 1639,

1761, 1769, 1874 and 1882.

The big scientific interest in those days was to calculate the distance between the Earth and the Sun, essentially by timing the transit from different places in the globe.

Knowing this "Astronomical Unit" would provide the yardstick for accurately mapping our Solar System and beyond.

Agence France-Presse

## Other skygazers

- In New York City, the Hayden Planetarium plans to set up a bank of telescopes in Central Park. The sun's image will be projected onto white screens so that the passage of Venus, will appear as a small black dot

- About 30 children have signed up for a 'Pajamas in Space' sleepover at the Denver Public Library. They will unfurl sleeping bags under a large screen onto which a recording of the transit will be projected

- Other enthusiasts have taken steps to give American soldiers serving in Iraq, Afghanistan and Kuwait — prime viewing sites — a chance to watch the transit.

Associated Press

**Getting a safe look at the Transit of Venus**

**Danger!**  
Never look directly at the sun with the naked eye.  
Short UVA, UVB rays  
Scattered by the eye

Continued or repeated observation  
Eye damage, blindness  
Damage can appear within hours or days of observing the Sun

**Risk-free observation**  
Solar eclipse glasses

**Do not use:**  
 sunglasses  
 smoked glass  
 X-ray film  
 binoculars  
 camera

# Warning over misuse of genetic data

By Ian Sample

Science & Technology

165  
100-17  
LONDON, MAY 15. The British Government's genetics advisers, the Human Genetics Commission, is considering proposals for a law to prevent people being discriminated against on the basis of their genetic make-up.

The proposed legislation is designed to prevent the emergence of a genetic underclass, where people find themselves rejected by employers and unable to get life insurance, as a result of having genetic tests for medical conditions.

The proposal comes from Sir John Sulston, the Nobel prize-winning scientist who led Britain's effort to unravel the three billion letter sequence of the human genetic code at the Sanger Institute in Cambridge, England. Professor Sulston, who sits on the Human Genetics Commission, has asked the committee to back his call for a tough mandate on genetic equity to prevent medical data from tests being misused by companies.

The proposal appears in a consultation document passed to members of the commission this week. In an interview with the London-based *Guardian* newspaper, Prof. Sulston said: "What we have to establish, right across the board, is the right for people to be treated equally, regardless of their genetic make-up. We can't just keep on fudging the issue."

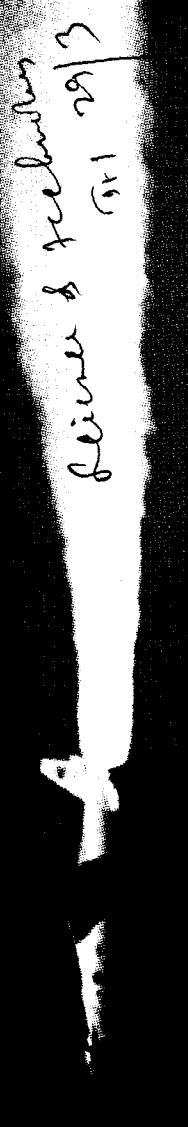
The proposal was submitted with the backing of John Harris, professor at the Manchester Law School, England, and adviser to the British Medical Association, and Simona Giordano, a bio-ethicist at Manchester University, both of whom sit on the commission.

The proposal states: "We affirm that humans are born equal, that they are entitled to equality of opportunity, and that neither genetic constitution nor genetic knowledge should be used to limit that equality ... this principle should be incorporated into U.K. legislation and practice."

A moratorium is already in place to prevent insurance companies from using all genetic tests to influence who they insure and what premiums they set. — ©*Guardian Newspapers Limited 2004*

THE HINDU 16 MAY 2004

# Nasa fires 'Holy Grail' of space travel



*Science & Technology*  
 29/3

**A Pegasus rocket ignites moments after being dropped from a B-52 bomber over the Pacific Ocean.**

**San Francisco:** A revolutionary jet engine flew faster than the speed of sound in a high altitude test over the Pacific on Saturday, marking what Nasa scientists hailed as a milestone in developing the "Holy Grail" of space travel.

"It's been an outstanding, record-breaking day," lead propulsion engineer Lawrence Huebner told a post-flight briefing.

Nasa's 12-ft-long X-43A research vehicle — resembling a winged surfboard — hit slightly over Mach

7, about 5,000 mph, during 11 seconds of powered flight before gliding at hypersonic speeds for several minutes and finally plunging into the ocean.

The test, conducted off the southern California coast, marked the first time that a "scramjet", or supersonic-combustion ramjet, has powered a vehicle at such high speed. "The ramjet-scramjet is the Holy Grail of aeronautics in my mind," project manager Joel Sitz told the briefing. "If you go from

ground to space, you need to use a ramjet-scramjet, if you're going to do it in the most efficient way."

Rather than carrying both the fuel and oxygen needed to provide acceleration, like a conventional rocket engine does, scramjet engines carry only hydrogen fuel and pull the oxygen needed to burn that fuel from the atmosphere.

Later this year, Nasa researchers hope to test the engine at Mach 10, or about 7,000 mph, as part of their Hyper-X programme. Reuters

# U.S. lifts sanctions on Pakistan

● 'For transition to democratic rule'

By Sridhar Krishnaswami

WASHINGTON, MARCH 25. In a move that clears the way for millions of dollars in direct economic assistance, the United States President, George W. Bush, has lifted the sanctions against Pakistan imposed after the 1999 bloodless coup that brought Pervez Musharraf to power.

In a memorandum to the Secretary of State on the decision to waive military coup-related provisions of foreign operations, export financing and related appropriations for programmes, Mr. Bush has issued a waiver saying that this would "facilitate the transition to democratic rule in Pakistan and is important to the United States' efforts to respond to, deter or prevent acts of international terrorism."

This follows the Bush administration's decision last week to give a new status to Pakistan as a major non-NATO ally which would, among other things, make it easy for Islamabad to acquire American weapons. Most of the sanctions imposed on Pakistan after the 1998 nuclear tests have also been lifted.

For some time now, Washington has been praising the Musharraf Government's fight against terror, especially as operations on the Afghanistan-Pakistan border have been stepped up to nab the terrorist mastermind, Osama bin Laden, and destroy his Al-Qaeda network.

## Pakistan elated

By B. Muralidhar Reddy

ISLAMABAD, MARCH 25. Pakistan is elated over the United States' decision to ease sanctions imposed after the President, Per-

vez Musharraf, took over power in a bloodless coup in October 1999.

The Foreign Office spokesman, Masood Khan, welcomed the announcement and said the restrictions were military and economic ones. The relaxation would help Pakistan grow in both the military and economic realms.

The Bush administration lifted some of the sanctions related to the military takeover last year. Islamabad had been pressing for the lifting of all the sanctions.

The announcement, coupled with the recent decision of Washington to recommend the naming of Pakistan as a "major non-NATO ally," is undoubtedly good news for Gen. Musharraf.

## Reports denied

In a related development, an official of the Pakistan Foreign Ministry denied reports in a section of the press that Islamabad had agreed to provide five new air bases to the U.S. forces fighting in Afghanistan.

He said that since Pakistan joined the U.S.-led coalition in the fight against terrorism, both sides had been engaged in close cooperation.

Pakistan was committed to providing help in three specific areas. These were over-flight facilities, the sharing of intelligence information and logistical support.

A few months after the U.S. launched military operations in Afghanistan, a report posted on the U.S. Central Command website had talked of the number of air sorties flown from Pakistan's air bases.

The item was removed from the site subsequently. However, by then damage had been done to Pakistan.

THE HINDU

5 MAR 2001

# Vast reserves of frozen water on Mars Pole

PARIS, March 17. — Mars holds huge reserves of frozen water in its southern Pole, according to the first detailed assessment of the data sent back by Europe's Mars Express spacecraft earlier this year.

Astrophysicists poured over information sent back by the orbiter's imaging spectrometer, which is able to detect elements in a planet's surface or atmosphere thanks to the spectrum of light that is reflected from the Sun.

Reporting in tomorrow's issue of *Nature*, the British weekly science journal, the French-led team say they have spotted frozen water in three forms in the Martian South Pole. The first is water ice mixed with "large concentrations" of frozen carbon dioxide on a large bright spot on the perennial polar cap — the cap that is

there all year round.

Beyond the boundary of the perennial cap, the frozen area advances and retreats in line with Mars' summer and winter.

Exactly how much of the ice on this bright spot is water rather than carbon dioxide is unclear. A good estimate would be about 15 percent, the scientists say.

The second form is in icy deposits that encrust rugged scarps around the polar cap, and which appear to be free of carbon dioxide.

But the most exciting find is huge icy deposits lying some distance away that seem to be a mixture of water and dust. This ice is present "along vast zones expanding down slope in stratified terrains, tens of kilometres wide, and tens of kilometres away" from the bright cap, the study says. — AFP

THE STATESMAN

18 MAR 2004

# Beyond Pluto, the Sun gets a 'tenth planet'

**Agencies**  
London, March 15

ASTRONOMERS HAVE found what could be the Solar System's 10th planet. It was first seen by astronomers working at California's Mount Palomar Observatory, and has been given the name 'Sedna' after the Inuit goddess of the ocean, BBC reported on Monday.

Observations show that it measures about 1,180 km to 2,360 km across, making it similar in size to Pluto. But there is likely to be some debate about whether it qualifies as a true planet, but some scientists are already saying it redefines our Solar System.

Sedna, or 2003 VB16, as it was originally called, is the most distant object yet found orbiting our Sun. It is three times further away than Pluto (average distance from the Sun

is 5.9 billion km).

It was discovered using the Mount Palomar facility in November by astronomers from the California Institute of Technology, Yale Observatory and the Gemini Observatory.

Follow-up studies by the Tanagra Observatory have measured the thermal radiation coming from Sedna to determine how hot it is, and therefore provide some estimate of its size.

This estimate is uncertain but the object is likely to be between half the diameter of Pluto (2,360 km); though some astronomers think it could be larger than the ninth planet itself.

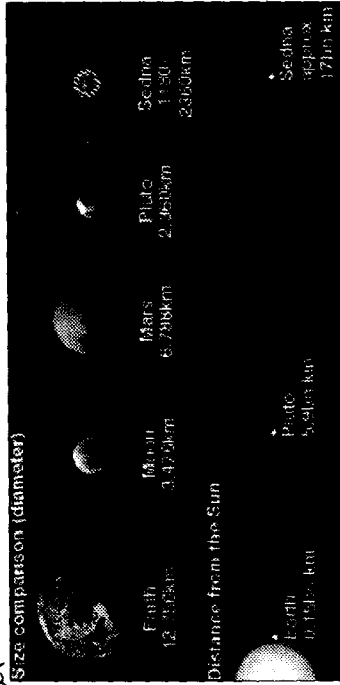
From the observations made so far, astronomers have determined Sedna's orbit to be a very large one. At present, it is 90 times the distance between the Sun and Earth (149 million

are being carried out by the Hubble Space Telescope and the Gemini Observatory.

But can Sedna called a planet? The new discovery will certainly reignite the debate about what constitutes a planet. One group of astronomers believes that Pluto is not a true planet but merely one of the largest of a vast number of minor objects in the outer Solar System.

The alternative standpoint is that Pluto is a planet and those who believe that will have to classify Sedna as the 10th planet.

But if the planetary status of Sedna — so named by its discoverers — is confirmed, astronomy's governing body, the International Astronomical Union, may want to reconsider the name to make it more consistent with the mythological names of other planets.



km), but its orbit can take it 10 times further away still.

Though Sedna could be a so-called Kuiper Belt object, its discoverers are not sure if it is because they consider it to be unlike any other object found till date. The Kuiper Belt contains hundreds of known objects and astronomers believe there are many more awaiting discovery. Most are small

More follow-up observations

## KUIPER BELT OBJECTS

- icy planetary bodies orbiting beyond Neptune in the Solar System's distant region
- More than 400 such objects are currently known
- They are believed to be remnants of the formation of the Solar System and among the most primitive objects available for study
- In recent years, astronomical work has thrown up several big objects
- Quaoar, found in 2002, is about 1,200 km across. Ixion, discovered in 2001, is 1,065 km wide. Varuna, detected in 2000, has a diameter of about 900 km
- In February this year, scientists picked up the object 2004 DW, which is thought to be 1,800 across



# Back to the Beginning

Another space mission to unravel  
the mystery of our origins

What's in a name? Plenty. The European Space Agency's first mission designed to study asteroids and comets is to be called the Rosetta Mission, after a stone of the same name — a basalt slab uncovered by French soldiers in 1799 in a remote village in Egypt's Nile delta. Analysing its markings enabled scholars to unlock the secrets of ancient Egyptian hieroglyphics, and it is hoped that its 21st century namesake would similarly help us widen our understanding of the Solar System. The Rosetta space mission is expected to collect valuable information on what comets are made of and how they materialised in the first place. Comets are often referred to as cosmic icebergs, for they are thought to contain the recipe of the primeval soup that provided the building blocks of all the constituents of the universe, including life. Comets contain compounds that are rich in carbon, hydrogen, oxygen and nitrogen — elements that make up nucleic and amino acids, the essential ingredients of life, as we know it. In fact, comets carrying microbes or its ingredients could have seeded Earth with life during one or another impact.

The Rosetta Mission is fascinating on two counts: First, the mission will have to circle round the Sun four times, Mars once and the Earth three times before gathering enough momentum and strength from the gravitational force of the planets and the Sun to catapult itself right across the Solar System to reach the Churyumov-Gerasimenko comet near Jupiter in 2014. Once there, it will orbit the 4km-wide ball of ice, rock and dust and make a detailed map of its surface. From analysing the images and data thus made available, scientists hope to learn more about our origins. The mission will generate its own power as it gains momentum during the first few years before it carries out its brief. The Rosetta Mission is one more symbol of our relentless search for the true nature of our origins. Second, the space endeavours — from telescopes probing far back in time to photographs that capture the birth of the universe, from the Moon and Mars missions to the search for extraterrestrial life — have all proved to be more than mere science; they are a continuation, by other means, of our collective search for the truth — about life and the cosmos. Indeed, we might never find out the truth about our origins. But as they say, it is the journey and not the destination that is truly instructive.

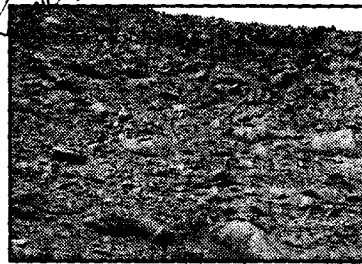
# Spirit reaches crater, finds rubble, no water

THOMAS H. MAUGH II  
PASADENA, MARCH 12

AFTER travelling over the Martian surface for more than 30 days to reach the Bonneville crater, NASA's *Spirit* rover peeked over the rim and found that the crater floor looks very much like the terrain it has already passed over, researchers said on Thursday.

Notably absent in the 220-yard-diameter crater were rock outcroppings like those found by *Spirit*'s twin, *Opportunity*, halfway around Mars in a much smaller crater at Meridiani Planum. Such outcroppings would have given the science team at the Jet Propulsion Laboratory in Pasadena, an idea of the rock composition below the surface at Gusev crater, where *Spirit* landed on January 3, and might have shed light on the question of whether large quantities of water once existed there.

The team has already confirmed that large quantities of water once existed at Meridiani Planum, where *Opportunity* landed on January 24. Although the team has yet to take high-definition pictures of the interior of Bonneville crater, which might reveal unexpected details, it now seems likely



A photograph taken by the *Spirit* 52 feet from the rim of the Bonneville crater. AP/PTI

that they will forego the chance to drive the rover into the crater. If the soil in the crater "is the same stuff we've been on and characterized already, then we'll go where the object of the mission suggests, which is someplace else, basically," said JPL scientist Matt Golombek.

Instead of entering the crater, *Spirit* will most likely skirt its rim and then head off toward the East Hills about 1 1/2 miles away from Bonneville. The new images of the crater show a layer of dusty soil punctuated by a "rubble" of small rocks. The two rovers both turned their cameras to the sky this week. *Spirit* snapped a picture of Earth about an hour before sunrise. —LATWP

# ইউরেনাসের চৌম্বকত্বের ব্যাখ্যা মিলল

প্যারিস, ১০ মার্চ—দুই বছর আগে ইউরেনাস ও নেপচুন নিয়ে বিজ্ঞানীদের কৌতূহলের শেষ নিহা। সেই কৌতূহলে নতুন ইচ্ছা জুগিয়েছে ওই দুই গ্রহের চৌম্বক ক্ষেত্র। বড় বিচিত্র তার প্রকৃতি এবং আচরণ। ১৯৮৬ সালে মার্কিন গ্রহসন্ধানী যান ভয়েজার-২ যখন ইউরেনাসের কাছ দিয়ে উড়ে গিয়েছিল, সে সময়েই প্রথম ধরা পড়ে

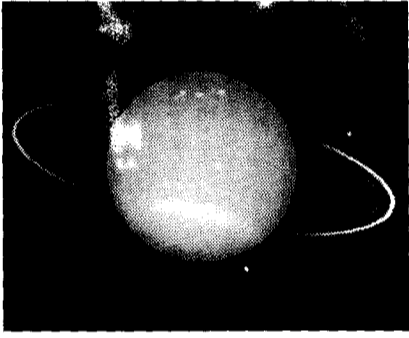
গ্রহটির চৌম্বক ক্ষেত্রের গোত্রছাড়া অবস্থান ও প্রকৃতি। পৃথিবী, এমনকী অতিকায় দুই গ্যাসীয় গ্রহ বৃহস্পতি এবং শনির চৌম্বকত্বের সঙ্কেত যা মেলে না। পরে ভয়েজারের পাঠানো তথ্যের ভিত্তিতেই আরও দুই নতুন গ্রহেরও একই রকম চৌম্বক প্রকৃতি আবিষ্কৃত হয়। বিজ্ঞানীরা এর কোনও সঙ্গত ব্যাখ্যা খুঁজে পান না।

সেই ব্যাখ্যা মিলেছে এতদিনে। এ সম্পর্কে নতুন এক তত্ত্ব হাজির করেছেন হার্ভার্ড বিশ্ববিদ্যালয়ের জেরেমি রঙ্গহাম ও স্যাবাইন স্ট্যানলি। কম্পিউটার মডেলের সাহায্যে এই ব্যাখ্যা বিখ্যাত বিজ্ঞান পত্রিকা 'নেচার'-এ প্রবন্ধাকারে তা প্রকাশিত হয়েছে।

কী সেই ব্যাখ্যা? পৃথিবী এবং সমজাতীয় কঠিন গ্রহে প্রাকৃতিক চৌম্বক ক্ষেত্র কীভাবে সৃষ্টি হয়েছে, বিজ্ঞানীরা তা আবিষ্কার করেছেন বহু কাল আগেই। পৃথিবীর অভ্যন্তরে স্ক্যান্ডিনেভিয়ামের অণুগুলি ঘিরে রয়েছে তপ্ত, গলিত লোহার স্তর। নিজ অক্ষের উপরে পৃথিবীর অধিরাম ঘূর্ণনের (আনুমানিক গতি) প্রভাবে মথিত, আবর্তিত হচ্ছে সেই তরল লৌহ-স্তর। এই আবর্তনের ফলেই প্রথমে বিদ্যুৎ এবং তা থেকে চৌম্বকত্বের উদ্ভব। অন্যান্য কঠিন গ্রহের ক্ষেত্রেও সোটাটমিট একটি চৌম্বক ক্ষেত্রের সৃষ্টি।

অতিকায় বৃহস্পতি বা শনি মূলত গ্যাসীয় পদার্থে গঠিত। বিজ্ঞানীদের অনুমান, ওই দুই গ্রহে চৌম্বকত্বের সৃষ্টি হয়েছে গ্রহপৃষ্ঠের কিছুটা নিচে থাকা যখন হাইড্রোজেন স্তর থেকে।

প্রবল চাপে ওই হাইড্রোজেন বিলিষ্ট হয়ে প্রোটন আর ইলেকট্রনের মিশ্রণে পরিণত হয়ে গ্রহের অতি ক্ষুদ্র কঠিন কেন্দ্রাঞ্চল ঘিরে আবর্তন করছে, যার ফলে সৃষ্টি হচ্ছে চৌম্বকক্ষেত্র। ইউরেনাস এবং নেপচুন মূলত গ্যাসীয় গ্রহ হলেও, তাদের কেন্দ্রাঞ্চল কঠিন। এই দুইটির অভ্যন্তরীণ গঠনও বৃহস্পতি এবং শনি থেকে কিছুটা আলাদা। জেরেমি ও স্যাবাইনের গবেষণা থেকে জানা যায়, অভ্যন্তরে তরল ধাতুর খুব পাতলা স্তর রয়েছে এবং অভ্যন্তরীণ স্তরের নিচে পাতলা ক্ষেত্র গ্রহ দুটির উপরতলের বাইরে। জল-স্তরের নিচে পাতলা একটি বলয়ের মতো অবস্থান করছে। ফলে ওই ক্ষেত্র একপেপে, তার উত্তর-দক্ষিণ চৌম্বক-রেখা গ্রহের মেরু ও বিষুবরেখার মাঝামাঝি বরাবর বিন্যস্ত এবং সেটা দু'দিকেই। পৃথিবীর বেলায় চৌম্বকক্ষেত্র এমন, যেন মনে হয় উত্তর-দক্ষিণ বরাবর বিশাল একটি বার-মাগনেট বা দণ্ডচুম্বক বসানো আছে। ইউরেনাস আর নেপচুনের ক্ষেত্রে মনে হবে, একটি নয়, বিষুবরেখার দু'পাশে আছে দু-দুটি দণ্ডচুম্বক। “আসলে ইউরেনাস ও নেপচুনের অভ্যন্তরীণ গঠন অনেকটাই অন্য রকম হওয়াতেই ওদের চৌম্বক ক্ষেত্রের এই বিচিত্র প্রকৃতি”, বলেছেন দুই গবেষক। ওদের এই তত্ত্বের অকাটা প্রমাণ মিলতে পারে, গ্যাসীয় অবশেষে ঢাকা হিম-গাভা ওই দুই গ্রহে ফের সন্ধানী যান পাঠানো হলে। কিন্তু আপাতত তেমন কোনও কর্মসূচি কোনও দেশেরই নেই।



অবশেষে ঢাকা হিম-গাভা ওই দুই গ্রহে ফের সন্ধানী যান পাঠানো হলে। কিন্তু আপাতত তেমন কোনও কর্মসূচি কোনও দেশেরই নেই।

—এ এফ পি

# Mars was once soaked in water

WASHINGTON, March 3. — The ancient surface of the Red Planet was once soaked in water and conditions may have existed for life there, the US space agency announced.

"The (rover) *Opportunity* has landed in an area of Mars where water once drenched the surface," Mr Ed Weiler, associate administrator of Nasa's Office of Space Science, told reporters yesterday.

The evidence, he said, was "a giant leap" towards determining whether life could have existed on Mars. Using an array of photographs, spectrometer data and scientific deductions from *Opportunity*, Nasa scientists said a rock near where the robot landed offered the most detailed, convincing and precise evidence that water once existed on the Red Planet.

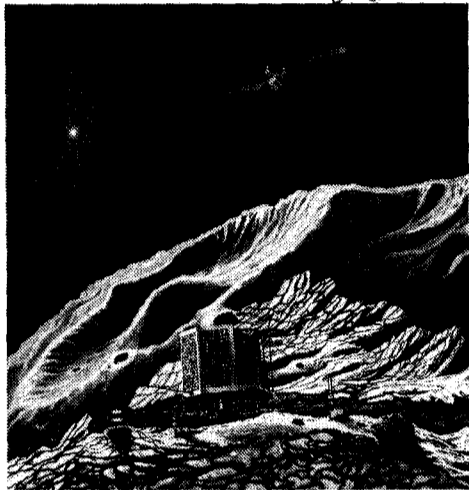
A rock near the rover's landing site that scientists have dubbed El Capitan offered multiple intersecting clues of the existence of water, said Mr Steve Squyres, a Cornell scientist and principal investigator of the Mars Exploration Rover.

Little spherical objects, which said looked "like blueberries in a muffin," stood out on the surface. These suggest that water within the rocks had "concreted" around the nuclei, Mr Squyres said. "Concretions form when there is liquid water." — PTI



This image of Mars released on Tuesday shows the El Capitan rock. — AFP

# Mission to land spacecraft on comet



This undated artist sketch released by the European Space Agency shows the Rosetta orbiter swooping over the lander soon after touchdown on comet Churyumov-Gerasimenko. — AFP

LONDON, FEB. 21. The countdown has begun to one of the most audacious missions in the history of space exploration — an attempt to land a tiny spacecraft on a comet. Europe's Rosetta spacecraft is due to be blasted into space next week on a 10-year, seven billion-mile journey across the solar system. Its destination is the comet Churyumov-Gerasimenko — a ball of snow and ice the size of Heathrow Airport currently hurtling towards the sun. On arrival in 2014, Rosetta will orbit the comet's nucleus and drop a lander the size of a washing machine on to its surface. Comets are the remnants of the formation of the solar system 4.6 billion years ago.

Scientists hope Rosetta will unlock the secrets of their chemical make up and reveal whether they once brought water, and even the building blocks of life, to Earth. Dr. Gerhard Schwehm, Rosetta's main scientist, said: "We will look back to the infant stage of the solar system when planets were formed out of a cloud of dust and gas." The probe was partly built by EADS Astrium in Stevenage. Ten out of its 21 instruments involved British scientists, while the U.K. has contributed £70 millions to the £600 million unmanned mission. It was originally scheduled to launch last year to study the comet Wirtanen but was postponed after the failure of an Ariane 5 rocket in 2002. The three-tonne craft is now scheduled to launch from Kourou, French Guiana, on Thursday.

Rosetta, named after the Rosetta stone, a slab of basalt which was the key to unlocking Egyptian hieroglyphics, is an aluminium box, 9ft by 6ft by 6ft. No rocket is powerful enough to take Rosetta all the way to the comet so it must bounce around the solar system, using the gravitational force of planets to pick up speed. It will orbit the sun four times, enter the asteroid belt twice, swing past Mars in 2007 and fly by the Earth in 2005, 2007 and 2009. It will reach the comet's orbit in May 2014. Over the next six months it will edge closer to its destination until it has matched its speed. It will start to map the comet's surface when it is about 24 km away. Once it has found a suitable landing site, it will release the lander — named Philae after an island in the Nile where an obelisk was found that gave Egyptologists the final clues needed to decipher the Rosetta stone.

The 100-kg lander will smack into the comet at walking speed and immediately release two harpoons to attach it to the surface. Once in position it will drill into the icy crust, analyse the terrain's make-up. The lander and orbiter will continue collecting data about the make up of the comet, sending it back to Earth as the comet approaches the sun and begins to melt, releasing a stream of dust and gas.

— ©Telegraph Group Limited, London, 2004

THE HINDU 22 FEB 2004

# Korean cloning a crime: Catholics

Vatican City, Feb. 13 (Reuters): Catholic officials today condemned the recent cloning of human embryos, with Pope John Paul's bioethics advisor calling it a repeat of what the Nazis tried to do in World War Two concentration camps.

"You can't kill human life in the hopes of finding medicines to save other lives," said Monsignor Elio Sgreca, vice-president of the Vatican's Pontifical Academy for Life.

"That would be a repeat of what the Nazis did in the concentration camps," Sgreca, who is close to the pope, said in a telephone interview. "The scientists are saying: 'First I'll clone you. Then I'll kill you.' This is not a victory but it is stepping on human life twice," he said.

South Korean scientists announced this week they had cloned several human embryos and extracted stem cells from

one. They were the first researchers to prove they had cloned a human embryo and said they did it not to make a baby but for the purposes of therapeutic cloning. Sgreca said: "This is not a victory for humanity but a crime twice over."

However, at a hospital clinic in Seoul, doctors and patients hoped the ability to clone human embryo cells might one day help patients with damaged spinal cords.

Dr Moon Suk-bang, a rehabilitation doctor at the Seoul National University Hospital, said the cloning experiment could allow him to treat patients who have been paralysed.

"Since a nerve may be restored if embryo cells are transplanted and a paralysed patient can expect the damaged part to rehabilitate, we can say this is groundbreaking," Moon said.

Stem cells in the tiny embryo

have the potential to develop into different types of human cells, opening the way for them to be cultivated and grown to become nerve cells or new organs such as a kidney, heart or even skin that is genetically identical to the patient's own cells.

The Catholic Church condemns all forms of research on embryos that leads to their destruction. Scientists believe the stem cells can lead to cures for diseases.

Stem cells, a kind of master cell, are found throughout the body but some scientists say adult stem cells are difficult to pinpoint and hard to work with.

Sgreca, who also heads an ethics centre at a leading Catholic medical school in Rome, said stem cells taken from umbilical cords or adults should be used for research instead because the process does not involve the destruction of life.

THE TELEGRAPH

4 FEB 2004

# Human embryo cloned

Science & Tech

## FROM ASIA, A MEDICAL MIRACLE WITH A MORAL TWIST

Agencies  
Seoul, February 12

SOUTH KOREAN scientists have become the first to successfully clone a human embryo, paving the way for the possible cure of many genetic diseases and even grow-your-own-organ transplants.

The cures will be achieved by extracting from the cloned embryo its stem cells — the building blocks of the human body that can develop into any kind of cell or tissue given certain conditions — and putting them into a patient's body.

The technique could one day allow a patient needing a transplant to grow his own organ and also lead to customised cures for Parkinson's, Alzheimer's, diabetes and other diseases.

But some experts have sounded a warning, saying the technique could be dangerous. Dr Patrick Dixon, author of *The Genetic Revolution*, said: "It's actually very difficult to grow embryonic stem cells, and they can go out of control quite easily and can become cancers after being put inside people."

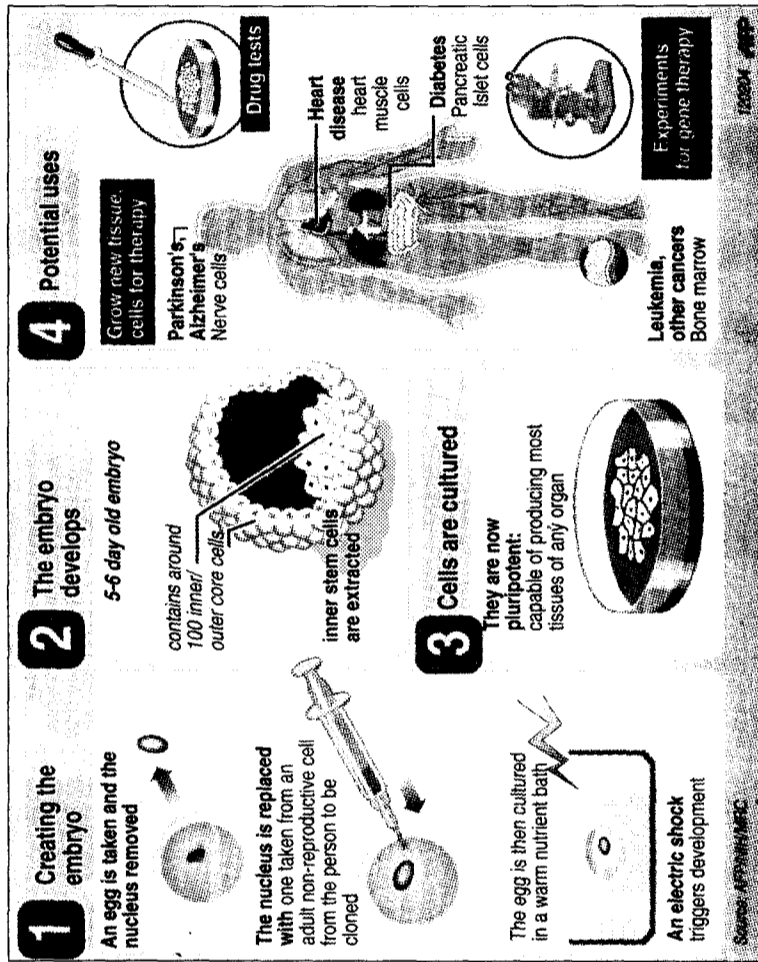
There is a moral angle, too. Though the breakthrough is not for cloning

human embryos — so the resulting stem cells would be genetically identical to the patient who needs them — have failed until now. Last year, a Massachusetts company, Advanced Cell Technology, said it had created a human cloned embryo but it had not grown to become a source of stem cells.

Scientists from the Seoul National University say they succeeded largely because they used extremely fresh eggs donated by volunteers and handled the genetic material inside them more gently than others. Woo Sukhwang, who led the study, said: "Our approach opens the door for the use of these specially developed cells in transplantation medicine."

"It's elegant work that provides long-anticipated proof that human therapeutic cloning is possible," said stem-cell researcher Dr Rudolf Jaenisch of the Whitehead Institute for Biomedical Research in Massachusetts. "Still it's not of practical use at this point."

Years of additional research are required before embryonic stem cell transplants could be considered in people, he stressed. See also Page 16



babies but to treat the ill, it's sure to revive international controversy over whether to ban all human cloning. For the culling of stem cells kills the embryo. Critics say destroying a human embryo, however tiny, is unethical. The Bush administration and its supporters in Congress want a worldwide ban on every kind of cloning, whatever its purpose. But Britain wants cloning research for medical application to go ahead. The UN recently put off a decision on the issue. Scientists have cloned sheep, cattle, mice and other species but attempts to clone

# Secrets out: Red Planet & Red Sea

## Storm & reef behind Moses 'miracle'

Press Trust of India  
Washington/Port Said, January 23

A RUSSIAN scientist has said the parting of the Red Sea to enable Moses and his followers to escape Egypt's soldiers could be explained by the laws of physics. Natum Volzinger, senior researcher at the St Petersburg's Institute of Oceanology, does not question the Old Testament claim that it was a miracle but says that God uses the laws of physics for such actions.

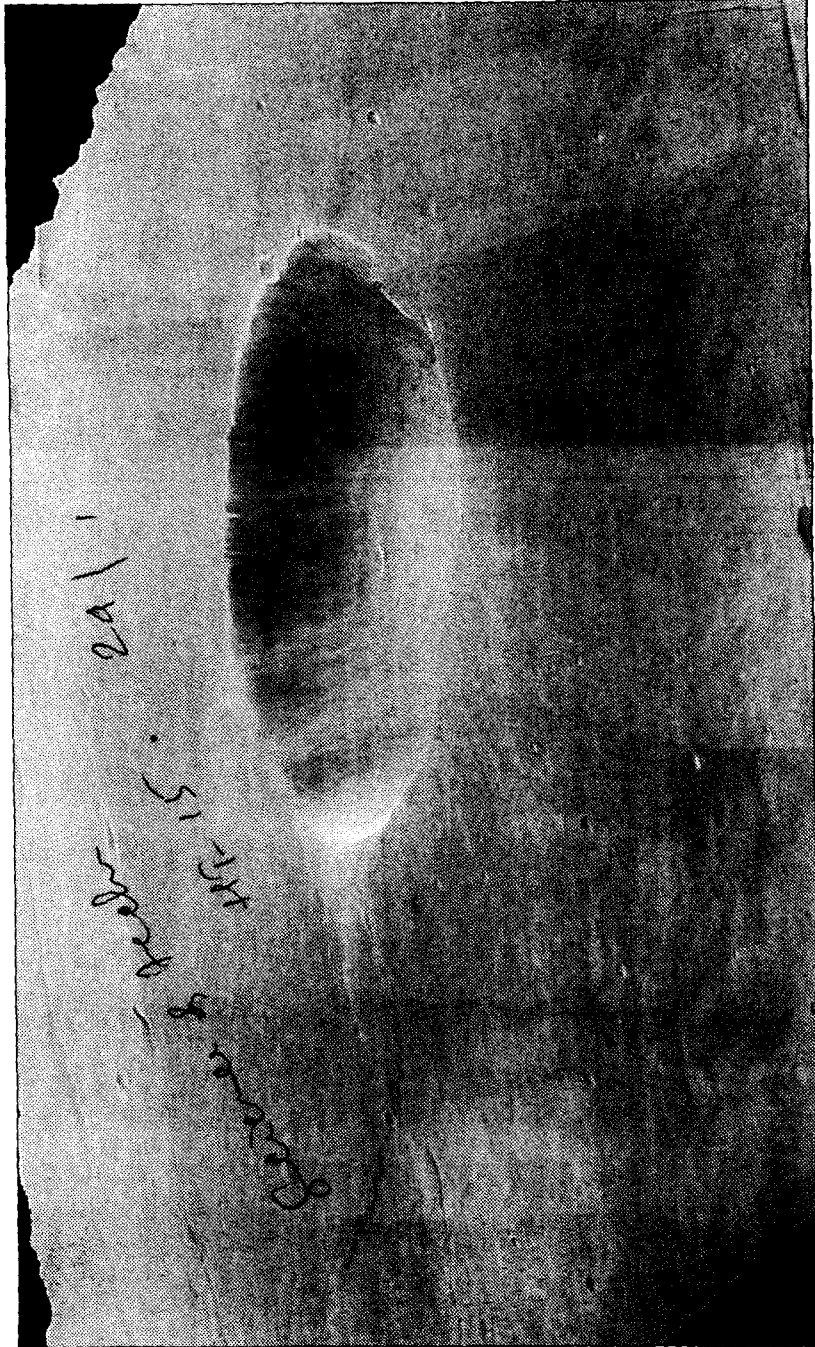
After studying the tides, winds and reefs common to the Red Sea for six months, Volzinger has concluded that the parting of the sea was because of stormy weather and a shallow reef. He said that if a strong wind blew at 30 metres per second over a shallow reef, then it could blow that reef dry for four hours, the

time it would have taken the fleeing Jews to cross over from Egypt.

The Bible describes the event thus: "And Moses stretched out his hand over the sea, and the Lord caused the sea to go back by a strong east wind all that night, and made the sea dry land, and the waters were divided."

### Suez Canal closed

Though a storm may have parted the Red Sea three millennia ago, high winds and strong waves on Friday shut the Suez Canal, linking the Mediterranean and the Red Sea, to traffic. Airports and roads elsewhere in Egypt were also closed because of sandstorms which reduced visibility to zero. Turkey closed the Bosphorous and Dardanelles straits, leaving dozens of vessels stranded.



EUROPEAN SPACE AGENCY VIA AFP

This picture was taken by the Mars Express in colour and 3D in orbit 32 around Mars on January 19. It shows a three-dimensional oblique view of the summit caldera of Albor Tholus, a volcano in the Elysium region, with a diameter of 160 km and height of 4.5 km.

24 JAN 2004



# Space ties head for the moon

By Chidanand Rajghatta  
TIMES NEWS NETWORK

**Washington:** Scientific and hi-tech exchanges between the United States and India may enter a new orbit following US President George Bush's invitation on Wednesday to other nations to join the renewed space exploration programming.

"The vision I outline today is a journey, not a race, and I call on other nations to join us on this journey in a spirit of cooperation and friendship," Mr Bush said on Wednesday while announcing an American return to the moon by 2020 latest, and using the moon as a launchpad to send man to Mars.

Although Mr Bush did not identify any countries, it is widely acknowledged in space exploration circles that China and India currently have the most active space programmes outside the US, and both are planning moon missions. Asked if Mr Bush

was referring to India and China, Nasa administrator Sean O'Keefe said, "Who knows? I wouldn't want to speculate."

But the invitation came less than 48 hours after Mr Bush announced a landmark agreement with India involving cooperation in civilian nuclear, space and hi-tech exchanges. Even ahead of the deal, Nasa and Isro, the principal space organisations of the two countries, have resumed institutional exchanges and cooperation after more than a decade of being adrift of each other.

There were also indications that New Delhi was ready and willing to accept the invitation. "India will certainly participate in the US initiative because we don't want to lag behind in the exploration of space," Isro chairman Madhavan Nair was quoted as saying in Bangalore.

Mr Nair said the extent of India's role had still to be determined, adding, "We'll firm up our plans for space ex-

ploration after bilateral discussions. Our role will depend on the progress of the dialogue with the US."

A significant, if unstated, factor in the cooperation will be the large number of scientists and engineers of Indian origin at Nasa and affiliate organisations, and also the institutional comfort between the two sides going back to decades of cooperation which was only ruptured in the 1990s. The US played a key role in India's early space and rocket ventures even through the Cold War years, including in early In-sat launches.

Mr Bush's revitalised and multi-pronged space plan envisages moving \$ 11 billion over the next five years from Nasa's current budget of \$ 86 billion while seeing an addition \$ 1 billion from Congress. In contrast, India's one-shot Chandrayaan venture, slated for 2008, is budgeted at a modest Rs 3.86 billion (less than \$ 100 million), highlighting the vast cost differential between the two countries.

# Bush wants an American first on Mars

HT-16 181

Reuters & AFP  
Washington, January 9

**BUOYED** BY the Spirit's successful landing on Mars, President George Bush plans a major announcement on space policy next week that envisions sending Americans back to the moon and ultimately to Mars, officials and congressional aides said on Thursday.

Nearly a year after the shuttle *Columbia* exploded on re-entering the atmosphere, sending *Nasa* into a deep spell of melancholy, Bush is expected to outline a sweeping vision of US space leadership. He is expected to propose a new lunar initiative leading to a permanent US presence on the moon and a mission to Mars in the long term, said the sources. An announcement is not expected before Wednesday.

Bush's ambitious plans coincides with a second day of *Nasa*'s efforts to clear the way for the Spirit to reach Mars' surface with little success. The airbags that cushioned the rover's landing are obstructing its path, and *Nasa* said on Friday that engineers are considering alternative routes for the six-wheeled explorer.

The earliest Spirit would leave

the lander and actually walk the Martian surface now is Wednesday. Further delays are possible if *Nasa* opts to send Spirit down an alternative ramp: a greater risk for the \$820 million mission.

But *Nasa*'s scientists are buoyed by the harvest of data that the rover has sent back, including high-resolution pictures and a full-colour panorama of the surface due to reach Earth next week.

Speaking to reporters with Bush in Florida White House press sec-



THE NEW YORK TIMES VIA ASSOCIATED PRESS  
The latest colour 'postcard' from Mars released on Friday has a panoramic view of the Red Planet's surface.

etary Scott McClellan said the Administration was also considering setting up a more streamlined hierarchy for guiding the government's wide-ranging space programmes and coordinating its research. In this scenario, there could be more exchanges of technology between *Nasa* and the military.

Some members of Congress are worried about ensuring the USA remains the global leader in space exploration. "If we don't do it, somebody else will," said Tennessee

Vice-President Dick Cheney was also involved in the policy development. The Administration was said to see the initiative as an important national security measure and experts said it could lead to new technologies and potential new sources of energy.

Bush's father, the former President, had proposed a mission to Mars that was scuttled because of concerns over its high cost. Bush Jr likewise faces budgetary constraints including a budget deficit topping \$500bn this year alone.

Bush's election-year announcement is likely to face challenges from fiscal conservatives and Democrats who want him to focus on domestic issues like education and health care. But the ambitious proposal will strike a chord with some lawmakers.

Experts said the goal should be to set up a research base on the moon to test technologies that would be useful on a mission to Mars. "The idea is to go to Mars. And the way you get to Mars is you go to the moon and you practice three days from home. It's the equivalent of climbing Mt Rainier and preparing for Everest," said space expert Howard McCurdy.

## Students paid to take long lie-in

**EIGHT** GERMAN students are being paid to stay in bed for two months as part of an effort to discover why astronauts always suffer from cold hands and feet in space.

Scientists at the Centre for Space Medicine at Berlin's Charité Hospital have hired them to lie in bed for eight weeks - the closest earthbound people can come to simulating weightlessness.

Sitting up is strictly forbidden: even showers and meals must be taken in the prone position. Doctors are hoping to discover how the blood's circulation is affected by space-like conditions.

The students will be paid £3,480 each for taking part in the research.

**The Guardian, Berlin**

# China, USA, Russia in science tie-up

Press Trust of India

BEIJING, Jan. 12. — China, the USA and Russia today inaugurated a global high-speed network for scientific research, the first of its kind in the northern hemisphere connecting major scientific centres such as Chicago, Moscow and Beijing.

Experts with the Chinese Academy of Sciences (CAS), sponsor of the trilateral project, said the Global Ring Network for Advanced Applications Development (GLORIAD), is expected to be an important platform for research for the Next Generation Internet (NGI).

The chief coordinator of GLORIAD, Ms Qian Hualin, said the new links enable research institutes in the three countries to communicate with each other and share scientific data, which might stimulate new advancement in basic research, Xinhua news agency reported.

GLORIAD is proposed as a 10-gigabit-per-second optical network around the northern hemisphere.

The ring begins in Chicago at the starlight facility, funded by the US National Science Foundation, crosses the Atlantic ocean to Amsterdam, continues to Mos-

cow and the Russian science city of Novosibirsk, goes on to Beijing and Hong Kong, and then crosses the Pacific Ocean to complete the circuit in Chicago.

"It could be used for transmitting scientific data at high speed, which might not be imagined on commercial networks," Ms Qian, who introduced the Internet in China in 1989 and helped realise the Chinese network infrastructure in 1994, said.

Ms Qian estimated that basic research in many areas would benefit from GLORIAD, such as natural disasters forecast, human genome mapping, exploration on outer space, earthquake monitoring, and high-energy physics.

"Chinese scientists are eager to exchange academic views and share scientific data with their overseas counterparts," she said.

Gloriad was developed from a US-Russian programme of Naukanet, which provides Russian scientists access to the NGI in the USA. In reciprocity, US researchers could also be linked to high performance Internet service in Russia.

The CAS, China's top scientific research institution, also viewed Gloriad as a vital step toward a Chinese NGO, coded e-science project, which is scheduled in 2006.

landed on the planet on Saturday. — NASA/AP

# Mars rover lands safely, sends images

PASADENA (CALIFORNIA), JAN. 4. The National Aeronautics and Space Administration's Spirit rover has sent its first images from Mars, showing a landscape scattered with small rocks that brought cheers from scientists. The NASA began receiving the first of an estimated 60 to 80 images from Spirit's cameras late on Saturday, just three hours after the robot made an apparently flawless landing on Mars.

Scientists quickly assembled multiple black and white images to form a sweeping panoramic view of the Martian landscape, as well as a bird's-

eyevew of the rover with its solar panels fully deployed. "This just keeps getting better and better. The pictures are fantastic," said the Mission Science Manager, John Callas. Spirit's successful landing bucked a trend of failed missions to the Red Planet. Just one in three past attempts to land on Mars has succeeded. NASA's last attempt to land on Mars, in 1999, ended in failure. "For us to see a success here, at least at this point in the mission, is a source of pride for all Americans," said John Marburger, Director of the White House Office of Science and Technology Policy.

Spirit is one of two six-wheeled robots expected to roam the planet for 90 days, analysing rocks and soil for clues that could reveal whether the planet was ever a warmer, wetter place capable of sustaining life. Scientists at NASA's Jet Propulsion Laboratory (JPL) let out whoops of joy when the first signals from the rover indicated it had survived the landing.

Mars was 106 million miles from Earth at the time.

The \$820 million NASA Mars Exploration Rover project also includes a twin rover, Opportunity, which is set to reach Mars on January 24.

Engineers believed that Spirit landed in Gusev Crater, a basin the size of Israel just south of the Martian equator. It should take scientists three or four days to pinpoint its location, said Steve Squyres, the mission's main scientist. After landing, Spirit took about 90 minutes to set up and go to work, retracting its air bags and deploying its solar arrays. The first photographs showed a flat, wind-swept plain peppered with rocks. Also visible were portions of the rover itself, including a tiny sundial it carried to Mars.

The images were the first from the surface of Mars since NASA's Mars Pathfinder mission in 1997. The first colour images were expected late on Sunday. Mission members said the rover would not trundle

away from the Lander for another nine days. "This is the time to be thoughtful and careful," the JPL Director, Charles Elachi, said. Powered by solar panels generating 160 watts at peak, Spirit will be able to roam from rock to rock. "Every day, it is like landing in another spot."

The rover relied on a heat shield, parachute and rockets to slow its descent to the surface, plus a cushion of balloons. The descent took just six minutes.

"I got quoted a lot saying it would be six minutes from hell. It was six minutes from hell. In this case, we said the right prayers and got to heaven," said Ed Weiler, NASA's Associate Administrator for Space Science.

While Mars today is a dry and cold world, river channels and other water-carved features suggest it may have had a more hospitable past. The rovers were built to look for geologic evidence that liquid water once persisted on the surface. — AP

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